

## **Improving land-use for integrated climate actions:** *An approach taken at the local level in the Philippines*

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# Background

- **Synergies** identified among various policies and measures for climate change adaptation and mitigation
- However, **little common understanding** established on how to integrate the policies effectively
- **A pilot project** (funded by Ministry of the Environment, Japan) initiated to develop a method to integrate climate policies, focusing on land-use planning
- Targeting a river basin, the project **support local government to improve its land-use** with climate consideration

# Pilot project: Target area



(Source: D. Macandog)

## Silang-Santa Rosa River Basin, The Philippines

Area shaded in red (above), topography (right)

Joint research with University of the Philippines at Los Banos

## Target area (2)

- 40km south of Manila
- Total basin area: 120km<sup>2</sup>
- Adjacent to Lake Laguna, the largest lake in Philippines
- Municipalities:
  - Laguna: Santa Rosa, Cabuyao, Binan
  - Cavite: Silang
- Total population: 570,000

## Target area (3)

- Environmental problems (Tongson, 2012):
  - **Population growth, land-use change, climate change** affect water resources in the river basin
  - As a result, water supply, public health, food security affected
  - Natural disasters such as **floods and land slides** intensified
- Municipalities revising **Comprehensive Land-Use Plan** (CLUP) with climate consideration
- University of the Philippines Los Banos (UPLB) study on **integrated watershed management** in communication with municipalities

# Methodology

Scenario development



Risk assessment



Climate change measure development



Climate-sensitive land-use planning

# Future scenarios

Development plan,  
land-use plan, etc.

**Industrialization,  
urbanization**

- Population growth, change in population distribution
- Change in land-use, land cover
- More infrastructure, buildings

**Climate change**

- Increase in hourly precipitation, rainfall duration, etc.

**Increase in areas affected by disasters (e.g., floods) and in damage to human and economy in the areas**

Baseline scenarios (w/o measures)

CC projection

**Climate change measures**

**Change in land-use, land cover**

- Forest, farmland > housing, industries

**Change in population distribution**

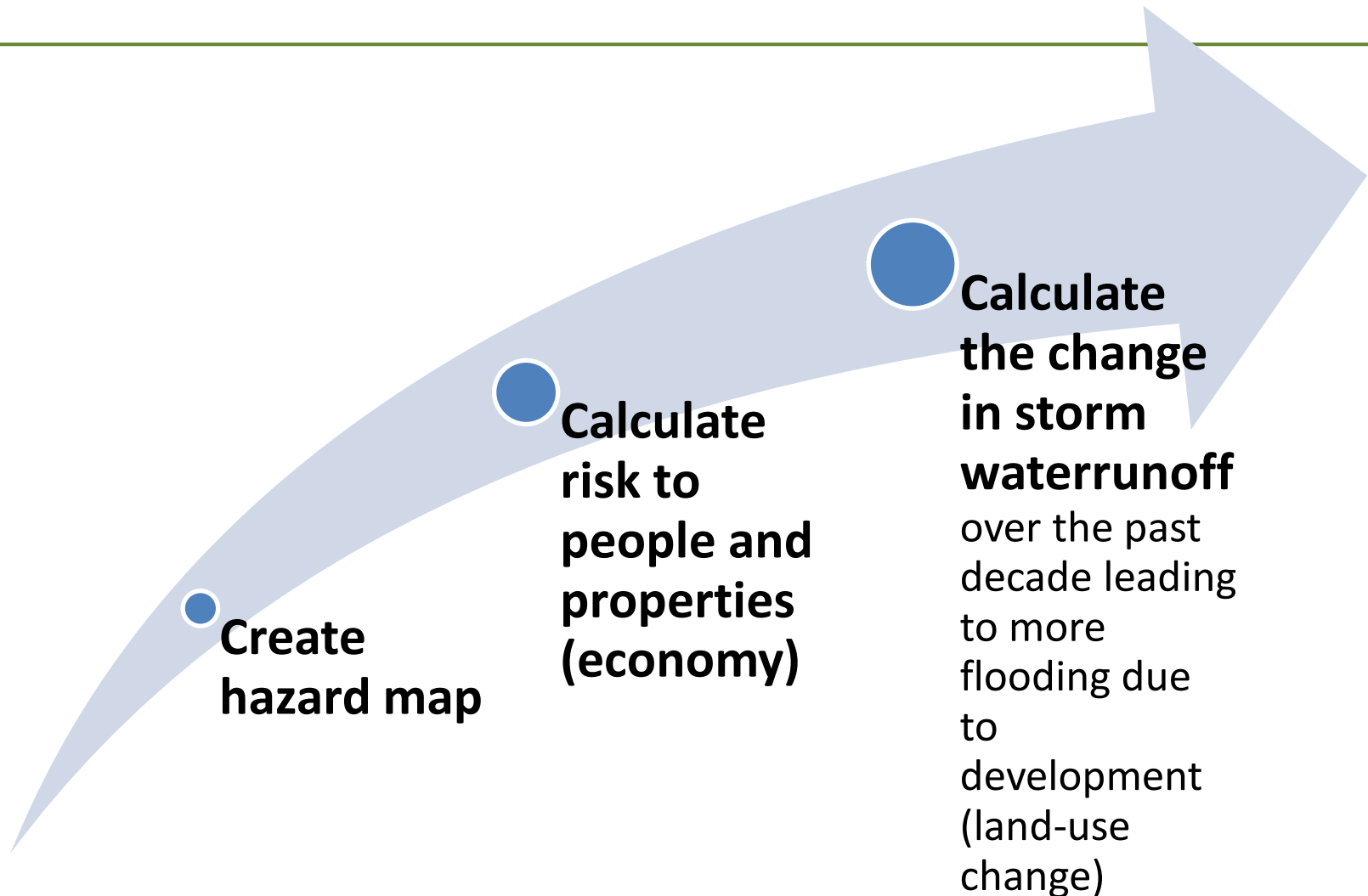
- Population decrease in high-risk & upriver areas

**Decrease of infrastructure & buildings in high-risk & upriver areas**

**Decrease in affected areas and human and economic damage**

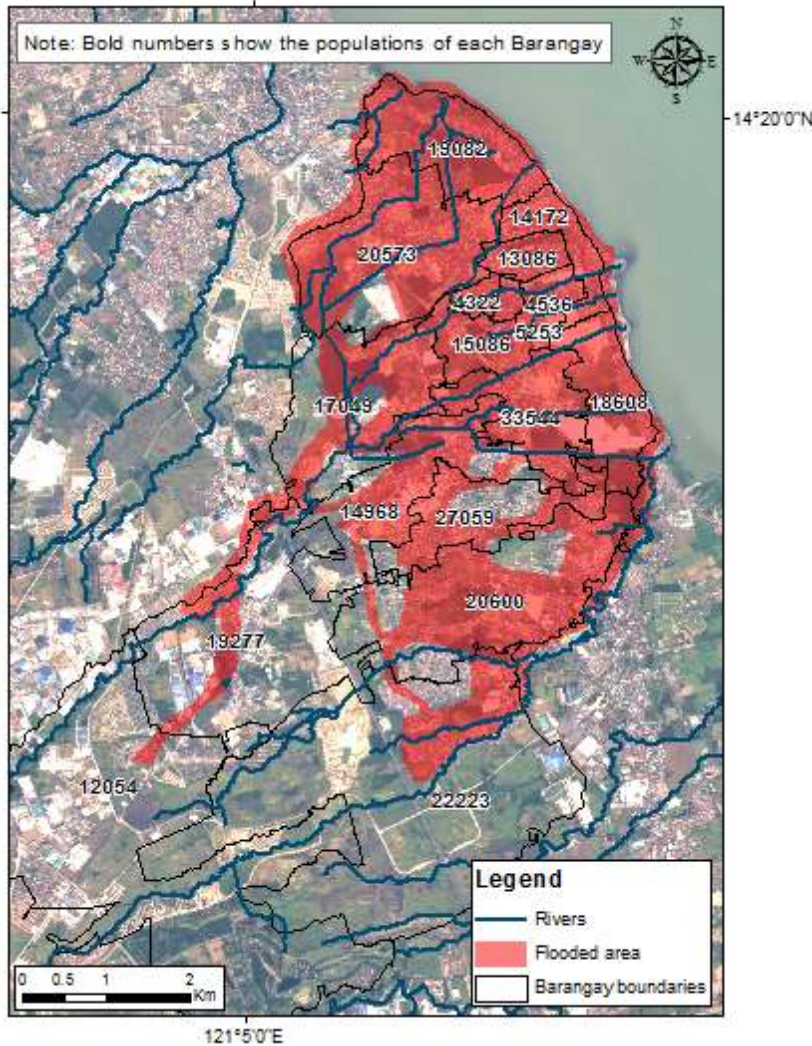
Action scenario (with measures)

# Risk assessment

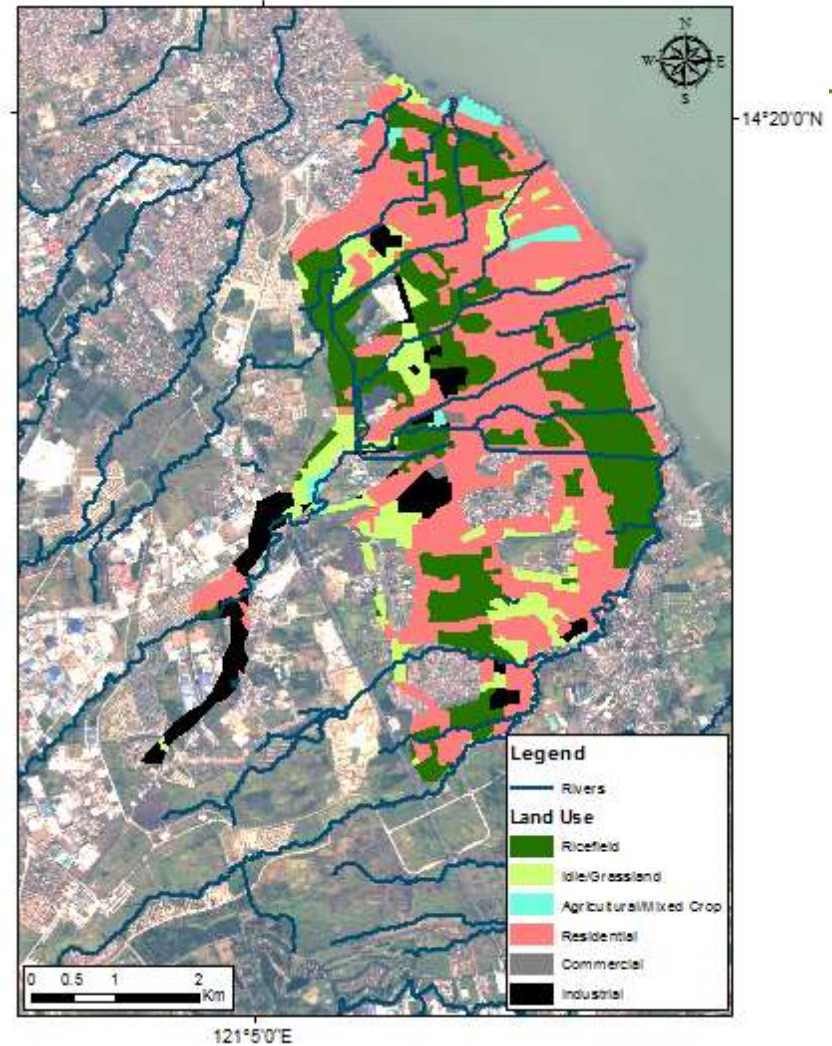




# Risk mapping



Population in flooded area: Over 100,000



Land use in flooded area

(Source: B. Johnson, IGES)

# Possible climate change measures

## Improved land-use

- Development control in high-risk areas – Climate change adaptation (CCA)
- Urban greening – CCA&M

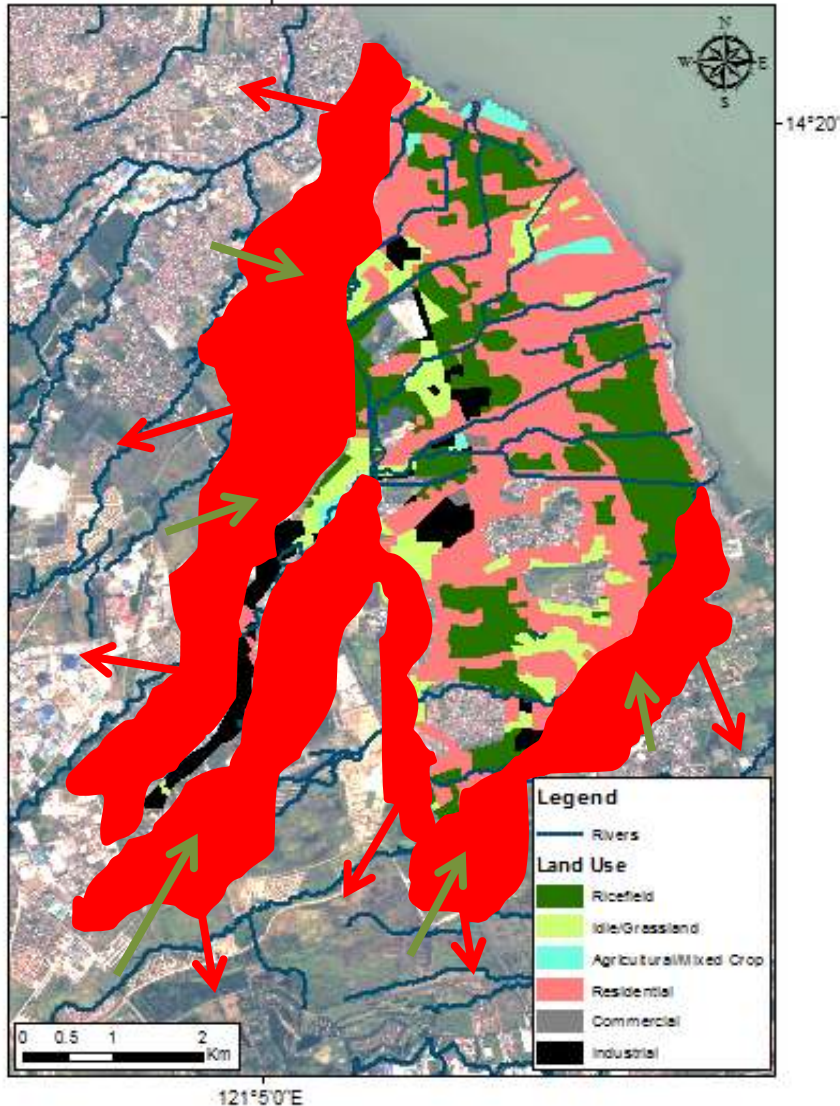
## Flood-tolerant, environment-conscious building

- Strengthened building codes in high-risk areas (e.g., embankment, high-floored housing) - CCA
- Roof greening, green building – Climate change mitigation (CCM)

## Ecosystem-based, integrated watershed management

- Maintenance and improvement of watershed protection function (flood alleviation, water retention ability) of ecosystem
  - Development control in upriver areas – CCA
  - Afforestation & reforestation – CCA&M
  - Watercourse management (e.g., riverbank reinforcement, dredging, river cleaning) – CCA
  - Change in varieties and cultivation methods of agricultural products – CCA

# Land-use in flooded areas according to future scenarios



	Baseline scenario	Action scenario
Flooded area	↑	↓
Agricultural land and green space	↓	↑
Residential and industrial areas	↑	↓
Affected people & economic loss	↑	↓

# Inter-city cooperation

- A mechanism for **cooperation between upriver and downriver local governments** sought with the following possible arrangements:
  - Designation of contact persons
  - Regular communication
  - Memorandum of agreement
  - Establishment of management council
  - Economic instruments (e.g., payment for ecosystem services)



# Conclusion/key messages

- **Improving land-use planning** can be one of successful approaches for effectively integrating climate change adaptation and mitigation measures.
- Land-use approach is **a systematic process with multiple steps**:  
1) Scenario development, 2) Risk assessment, 3) Climate change measure development, and 4) Climate-sensitive land-use planning.
- **Targeting/managing river basin as a whole** with inter-city cooperation helps address climate-related disasters (e.g., floods) downstream.
- **Ecosystem-based, integrated watershed management** can provide technically- and economically-feasible solutions and co-benefits to address conservation and climate disasters at the same time.

